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COLLEGE STATION, BRAZOS COUNTY, TEXAS

BULLETIN NO. 358 JUNE, 1927

DIVISION OF FARM AND RANCH ECONOMICS

AN ECONOMIC STUDY OF THE DAIRY INDUSTRY IN TEXAS

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

T. O. WALTON, President

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SYNOPSIS

In this study of the dairy industry in Texas, producers and distributors were interviewed and estimates made of (1) the production and distribution of whole milk, (2) the production and distribution of butter, and (3) the production and distribution of ice cream. The historical background is introduced in in order to weigh the importance of the various stages of production and distribution found.

In 1870, according to census reports, there was one dairy cow to each 1.33 persons in Texas, with an annual production of twenty-six gallons of milk per cow. The 1920 census showed there was one dairy cow to 4.65 persons in Texas, with an annual production of 214 gallons of milk per cow.

Although the production of milk in Texas since 1870 has greatly increased, Texas still has a very low average production as compared with dairy states. For example, the average for the United States for 1920 was 396 gallons, or 182 gallons above the average for Texas. Expressed in terms of rank, Texas stands fourth from the lowest on the basis of milk production per cow.

The data collected from four retail distributing plants in 1922 show that the producer gets 44.6 cents and the distributor gets 55.4 cents of the consumer's dollar spent for retail milk in Texas. The distributor's spread is 7.9 cents per quart of milk.

The centralizers and the sweet-cream creameries are rapidly displacing the small creamery. During the last seven years forty-two per cent of the small creameries manufacturing butter from sour cream ceased operations.

Texas purchases over 40 per cent of the creamery butter consumed.

Two-thirds of the ice cream plants studied use milk powder in the manufacturing of ice cream.

The ice cream plants sell about seventy-five per cent of the cream they manufacture in the community or town in which they are located.

The iceless refrigerator is replacing the ice and salt system of packing ice cream. After the initial cost, the iceless refrigerator is cheaper to operate and keeps the cream at a more constant temperature than the ice and salt method.

Ice cream is consumed more in the summer than in the winter. About three-fourths of the ice cream in Texas is consumed from April to September, inclusive.

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BULLETIN NO. 358 JUNE, 1927

AN ECONOMIC STUDY OF THE DAIRY INDUSTRY IN TEXAS*

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The chief purposes of this study were to determine to what extent Texas is producing dairy products for her own consumption, and whether this production can be profitably increased, and to analyze the methods used in marketing the various dairy products, with the view of making suggestions for economical improvement.

Method of Procedure

The information was secured in person chiefly by the use of two kinds of schedules, one for the producer, and one for the distributor. The schedule for the producer was designed to find out the production problems as they relate to the distribution of dairy products. The distributor's schedule dealt with the purchasing and distributing of dairy products and also his relations with the producer and the consumer developing from these transactions.

The producers' schedules were filled out by producers located around Dallas, Fort Worth, San Antonio, Houston, and Galveston, Texas. The distributors' schedules were filled out by distributors of dairy products located in Dallas, Fort Worth, San Antonio, Houston, El Paso, Galveston, and Amarillo, Texas. These distributing plants distributed annually approximately 2,000,000 gallons of whole milk, 6,000,000 pounds of butter, and 1,500,000 gallons of ice cream.

Number of People Compared to the Number of Dairy Cattle in Texas

Texas has ranked high in comparison with other states in the production of beef from the beginning of the history of the State. The development of the dairy industry, however, has been more recent. The Census Report of 1870 reported 604,215 people and 615,000 dairy cattle in Texas at that time. The Census of 1920 showed the population of Texas to be 4,663,288 and the number of dairy cows of Texas to be 1,002,000. Figure 1 contrasts the relative increase of people and dairy cows in Texas for the period between 1870 and 1920. The population increased four times as rapidly during this period as the dairy cattle.

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*Through Dr. Theodore Macklin of the University of Wisconsin, the National Farm Bureau furnished a portion of the funds to defray the field expenses in collecting the data used in this publication.

†Submitted to the Faculty of the Agricultural and Mechanical College of Texas, in June, 1926, in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Adminstration.

During the same period of time the Census shows that the average annual production of milk per dairy cow in Texas increased from 26 gallons in 1870 to 214 gallons in 1920. The low production shown by the Census for 1870 is probably due to consideration of cows not now considered as dairy cows.

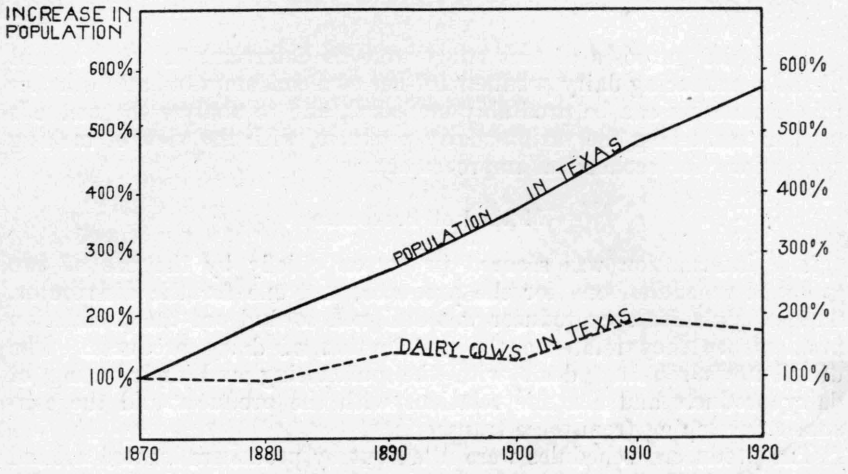

Fig. 1.—Comparison of the per cent increase of dairy cows with the per cent increase in population of Texas for the period 1870-1920.

The increased production per dairy cow, together with the increase in the number of cows attained in 1920, therefore, provides over 45 gallons, or a pint of milk a day per person per annum, as against about half as much in 1870. The 1920 production is near the average consumption of milk per person in the United States, but does not provide for butter, cheese, ice cream, canned milk, and milk powder, which, on account of the demand, are being shipped into Texas daily in large quantities.

High and Low Producing Sections in Texas

Figure 2 shows the average production per cow for each county, according to the United States Census. A total of 184 counties, or 70 per cent of the 253 counties in Texas, have an average annual production per cow of less than 251 gallons of milk. The fact that in the other 30 per cent of the counties, the productions range from 251 gallons to 713 gallons per cow indicates that there are further possibilities of increasing the average production of milk per cow in Texas.

MARKET MILK

Market milk is the milk usually sold in bottles or cans. It has been cooled and strained but not separated.

The larger part of this study of market milk has reference to condi-

tions prevailing around the cities. The distribution of market milk will be taken up from two standpoints: namely, that of the producer and that of the distributor. Texas does not have as large cities nor as many cities in proportion to area as a number of the other states; hence the distribution of market milk in Texas has not become as great a problem as in certain other states.

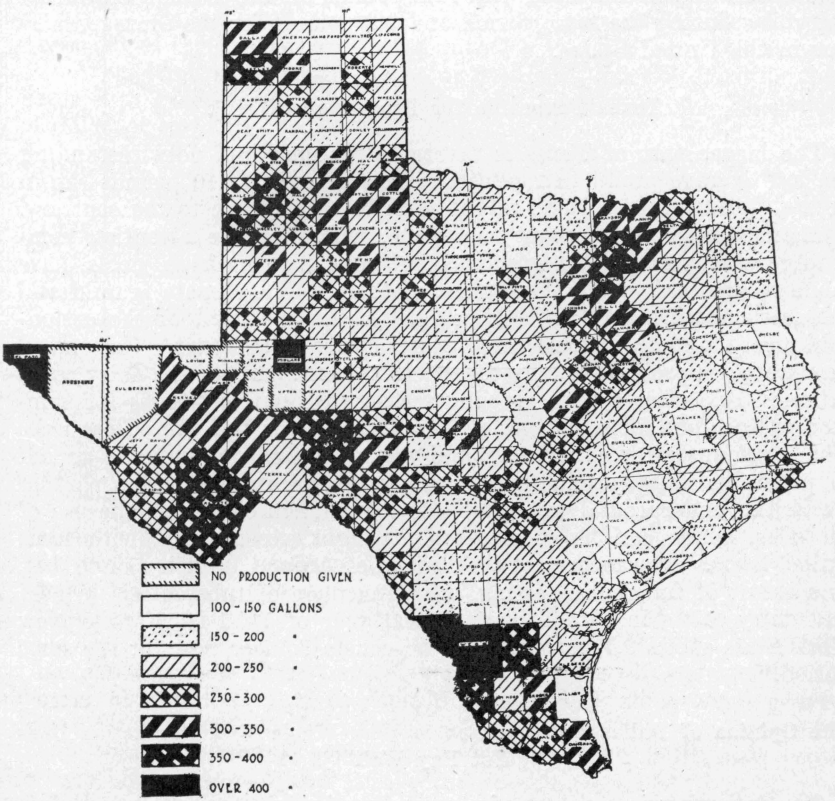

Fig. 2.—Average milk production of dairy cows in Texas counties in 1919. From 1920 U. S. Census.

The Production of Milk by Texas Dairy Cows Compared with That of Dairy Cows in Other Sections

In the rural districts of Texas, the farmers consume practically all of the dairy products produced on their farms. They do not have a marketing problem of dairy products until they have a surplus above their own needs. If this surplus is produced at a high cost, no form of marketing could secure a profit for them. If it costs fifty cents a gallon to produce milk, there is no marketing plan under present

standards whereby the product could be distributed at a profit to the producer. The average dairy cow in Texas produced 1,840 pounds of milk in 1919 according to the Census. During the same period the average California dairy cow produced 4,610 pounds, and the average production for the dairy cow in the United States was 3,412 pounds. The calculated daily production of the average Texas dairy cow is five pounds of milk, as compared with 12.6 pounds for the average California dairy cow during the same period and 9.3 pounds for the average dairy cow in the United States.

Texas Favorable for Production of Milk

The larger part of Texas is favorable for dairying, notwithstanding the low average production per dairy cow of only 1,840 pounds shown in the Census report, which might seem to be evidence to the contrary. Numerous herds throughout the State, which receive attention comparable with that given herds in those states showing high yields, have made records well up to the highest of them. The climate is mild and the cattle require very little housing. About one-third of the cottonseed meal produced in the United States comes from Texas. Cottonseed meal supplies protein, usually the most expensive part of the dairy cow's ration. Texas has a long growing season with native grasses for summer pasture and in some sections small grain for the winter pastures. The sorghums grow abundantly and make good silage, which is an aid to profitable dairy production in many cases. In the larger part of Texas the underground water table is low enough to permit the use of pit silos, which can be constructed at slight expense and with little skilled labor. The records of the Bureau of Animal Industry show that, as a result of tuberculin testing, the percentage of tuberculosis in beef and dairy cattle in Texas for the fiscal year of 1926 is .9 while New York State shows 9.7 per cent and Wisconsin 3.6 per cent for the same period.*

The Opinion of Dallas Dairymen as to Why Whole Milk Production Does Not Pay Well

The following is a digest of answers received in reply to a schedule secured from twenty-two dairymen in 1924 who produced and supplied market milk to the city of Dallas. Seven thought that the price the producer received for his milk should be higher. Their answers ranged from 26 cents to 50 cents per gallon, the average being 33 cents. Eight gave the following reasons for existing conditions: poor-producing cows, high-priced feed, and poor management. Seven were satisfied and were making money. The length of operation varied from one to fifteen

*Information secured from Tuberculosis Eradication, Division of Animal Industry, United States Department of Agriculture, Washington, D. C.

years; however, nineteen out of the twenty-two dairymen had begun operations since 1914. This shows that the majority of the men started into the dairy business between 1915 and 1920. At that time prices of dairy cattle and dairy products were high. The high prices acted as a stimulus to farmers very poorly equipped and with little or no dairy experience to go into the dairy business. Eighteen out of the twenty-two did not have concrete floors or lights in their barns. Thirteen out of twenty-two reported on silos. Four had silos and nine did not. Three out of the twenty-two started with registered sires. Ten are now using registered sires, while twelve, or over half, are still heading their herds with grade sires. The average daily production was 1.6 gallons of milk per cow.

Table 1.—Milk production and size of dairy herds in Dallas County, Texas, for the year 1922

Size of Herds and Number of Cows in Each	Number of Herds	Total Number of Cows	Milk Produced, Gallons	Average Number Cows in Herd	Average Daily Gals. Milk Produced Per Cow
Total	490	8,654	13,965	17.6	1.61
1— 5	78	300	512	3.8	1.71
6— 10	132	1,034	1,659	7.8	1.60
11— 15	91	1,170	1,904	12.9	1.63
16— 20	69	1,239	1,976	17.9	1.59
21— 25	32	742	1,026	23.2	1.38
26— 30	30	856	1,527	28.5	1.78
31— 35	13	442	690	34.0	1.56
36— 40	12	474	729	39.5	1.54
41— 45	6	255	426	42.5	1.67
46— 50	5	248	420	49.3	1.69
51— 55	4	209	365	52.2	1.74
56— 60	4	228	310	57.0	1.36
61—100	9	687	971	76.3	1.41
101—300	5	770	1,441	154.0	1.87

If one can take twenty-two dairymen as an adequate sample, the dairymen of Dallas could be divided roughly into three equal groups, according to their ideas for relief in production of dairy products; one-third looking to higher prices for relief; one-third looking to better management; and one-third satisfied and making money.

The Size of Herds and Production of Cows Supplying the Dallas Territory

The data for Table 1 were secured from the milk inspector's office in the city of Dallas in 1923. Four hundred and ninety dairymen were milking eight thousand six hundred and fifty-four cows, which produced thirteen thousand nine hundred and fifty-six gallons of milk daily, with an average of 17.6 cows to the herd, and an average production per cow of 1.61 gallons. The dairies supplying the milk for Dallas are located at various distances from the distributing plants. The shortest distance from the dairy to the plant is only a few blocks; the longest is seventy miles. The dairymen farthest away have to pay the greatest amount

of transportation charges on their milk from the farm to the distributing plant. The dairymen out several miles from the city, as a rule, can own more land for the same investment, which will enable them to have more land for pasture and for growing feed. This, as a rule, more than offsets the extra transportation charges on the milk.

Table 2.—Classification of fifteen distributing plants.

Kind of Plant	Number of Plants
Retail milk	2
Wholesale milk	4
Wholesale and retail milk	2
Wholesale milk, ice cream	1
Wholesale and retail milk, ice cream	1
Wholesale and retail milk, ice cream, butter	3
Wholesale and retail milk, and all other dairy products	2

Distribution of Market Milk

The study of the distribution of milk was limited to cities with a population over 100,000, with one exception; namely, Galveston, which has about 50,000, and was included because Texas has a number of other cities about this size that are distributing milk and cream under similar conditions.

Table 2 shows the products handled by fifteen of the leading milk-distributing plants. Eight of the fifteen plants handled milk only. Seven of the fifteen plants distributed market milk and handled other dairy products as well. It might be stated here that the other dairy products handled by these plants, such as ice cream, butter, and cheese, were sold both wholesale and retail. Another classification of the plants might be made on the basis of those that distributed retail milk and those that distributed both retail and wholesale milk. Two of the fifteen plants were retail; five were wholesale; and eight were both retail and wholesale. This classification points out that only fourteen per cent of the fifteen typical city distributing plants are catering strictly to the retail milk trade. It is doubtful whether there is a city distributing plant in the State that does not sell a small amount of milk wholesale. The retail milk-distributing plants in Texas are gradually changing to wholesale plants, and many of the wholesale plants in their bill-board advertising call the attention of prospective customers to the fact that milk and cream may be secured fresh and cold from the groceryman. In starting a milk-distributing plant, the risk is less if distributing is done on a wholesale basis. The plant can be started with less equipment and less labor. It is able to begin distributing with a larger volume than a retail plant because wholesale customers buy larger quantities at a time. Collecting and loss of bottles will not be as great delivering wholesale as delivering retail. The producer who retails, however, gets more for his product than the producer who sells wholesale.

Table 3.—Load carried by wagon, truck, horse, or truck-ton by two distributing plants, 1922.

Method of Delivery	Quart-points*
Wagon	383
Truck	577
Horse	255
Truck-ton	323

*Quart-points equal one quart of milk, two pints of milk, one quart of buttermilk, and one-half pint of cream.

Method of Delivery

The delivery equipment in eleven plants was studied. The plants were divided into three groups as follows: group one delivered with horses only; group two delivered with trucks only; and group three delivered with both horses and trucks. In summing up the method of delivering of eleven distributing plants in Texas, it was found that two plants used horses only, six plants used trucks only, and three plants used both horses and trucks.

Relative Efficiency of Trucks and Horses

This comparison is made between only two plants, one using horses for delivery and the other using trucks. Table 3 shows that one wagon carried 383 quart-points and the truck carried 577 quart-points. The wagon carried 66 per cent as many quart-points as the truck. In the same table the comparison is made between the horse and truck-ton. The horse pulled 255 quart-points, while the truck-ton carried 323 quart-points. This does not mean necessarily a ton-truck. The average was derived by dividing the total ton-capacity of the trucks into the number of quart-points distributed by the trucks, giving the number of quart-points each ton delivered.

Table 4.—Size of load carried by milk wagons of three states and two cities.

Section	Number of Quart-points Carried
Texas (two plants)	383
*Louisiana	268
*Ohio	361
*Chicago	385
*New York City	252

*Kelley and Clement, Market Milk, page 334.

Table 5.—Price the producer received for milk from four distribution plants in two cities in Texas in 1922.

Four per cent butter fat basis.

Plant Number	Per Gallon	Per 100 Lbs. Milk	1 Lb. Butter Fat in Milk*
	Cents	Cents	Cents
Average	25.4	2.95	.74
2	25.8	3.00	.75
4	25.8	3.00	.75
8	27.5	3.20	.80
9	22.4	2.60	.65

*This is placing the value only on the butter fat, and does not consider the other constituents found in whole milk.

The Load Carried by Texas Retail Milk Wagons Compared With That of Other Sections

Further comparisons are made in the size of load carried by milk wagons in Texas and that of other sections. This comparison is given in Table 4. The Texas wagons carried a small amount of wholesale milk, which was reduced to quart-points. In Louisiana, the nearest state to Texas, the wagons carry 115 points less than those in Texas. The load of 383 quart-points for the two plants in Texas does not represent the average load carried by the delivery wagons in the small towns of the State, which would probably be lower, but is representative of the load carried by the wagons of the retail distributing plants in the larger towns and cities. While wagons in Louisiana carry 115 points less than those in Texas, those of Chicago carry 2 points more.

Price of Milk Paid the Producers by Four Distributing Plants in Texas in 1922

Table 5 gives the prices paid the producer for milk in 1922 by four distributing plants in Dallas and Houston, Texas. Plants Numbers 2 and 4 bought their milk on a four per cent butter fat basis, cooled to forty degrees and delivered at the plant. Plants Numbers 8 and 9 bought their milk on a basis of eighty and sixty-five cents per pound of butter fat, respectively, cooled and delivered at the plant, the discrepancy in price being due to differences in the standard of quality required. From these prices Table 5 was derived.

The greatest difference in price the producer received for milk was between Plants Number 8 and Number 9, being 5.1 cents per gallon, which is equivalent to 60 cents per hundred pounds of milk or 15 cents per pound of butter fat. This difference in price was passed on to the consumer, who in turn received a higher quality of milk. The buying of market milk on a butter-fat basis is to be recommended over buying it on a flat-rate basis, but cleanliness must also be considered. Buying on a

butter-fat basis discourages the adulteration of milk, and it stimulates culling out the cows producing milk with a low butter-fat content, raises the quality of the product, and insures the delivery of the full amount of butter fat for which the buyer pays.

Improving Quality of Milk by Sediment Test

It is possible to get the farmer to improve the quality of milk by systematic tests. Some progressive buyers filter samples of milk bought, through cotton pads and by noting the varying amounts of sediment on

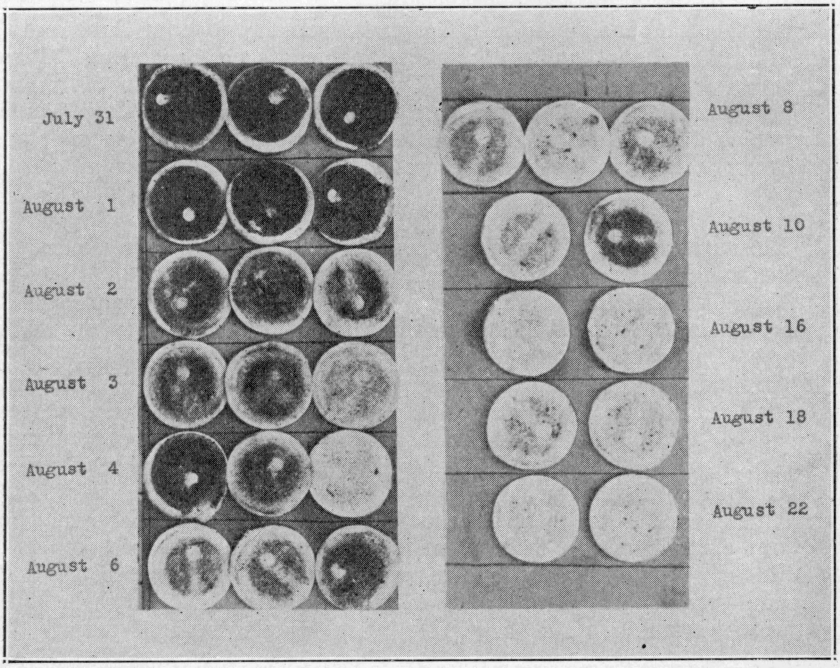

Fig. 3.—Cotton pads showing results of sediment test of milk on consecutive dates.

the pads can estimate the cleanliness of the milk received. Figure 3 shows a sediment test run by plant Number 8 in Table 5 and will throw some light on the price paid the consumer between Plants Numbers 8 and 9 in Table 5. On July 31, 1923, the producer started delivering to Plant Number 8 three cans of milk daily. As indicated by the three pads, one pad was used daily for each can of milk tested. The date the test was made is entered in the margin opposite the pads in Figure 3. Three cans of milk were tested each time until August 10; then two until August 22, when the last test was made. The milk was very dirty at the start, as indicated by the dark sediment on the cotton pads.

These sediment tests extended from July 31, 1923, to August 22, 1923, with the marked improvement as indicated by the white, or clean appearance of the last three tests run. If the producer who delivered the milk from which these tests were made had not shown marked improvement, the distributing plant would not have continued to purchase his milk. As previously stated, Plant Number 8 pays eighty cents per pound for butter fat, and requires the producer to deliver a high-class product. This plant in turn receives the highest market price for all the dairy products it handles, with a rapidly expanding business.

Plant Number 9, shown in Table 5, is located in the same city as Plant Number 8 and pays for the milk on a basis of 65 cents per pound for butter fat, runs no sediment tests, and sells its milk for three cents a quart under Plant Number 8; yet its business is not expanding. Plant Number 8 pays the producer over five cents a gallon more for milk than Plant Number 9 on a four per cent butter fat basis. This is an instance in which a high-class product meets the approval of the consumer and proves profitable to the producer and distributor alike.

A Plan for Handling Surplus Whole Milk

The surplus milk is here defined as the seasonal increase in production which usually occurs in the spring.

Very little effort has been made in Texas, until recently, toward solving the problem of surplus milk. In this connection the distributors of the city of Dallas have done as much as those in any other section of the State and probably more. Their efforts have been directed mainly toward increasing winter production and discouraging a large increase in spring production. The aim of such efforts is to bring about more uniform production of milk, leading to greater stabilization of prices. According to their plan, the average production and prices paid to the producer are designated as a basis for the remainder of the year. For example, if a producer delivers on the average of six hundred pounds of milk daily during the designated winter months, and increases the milk he delivers to the plant to seven hundred pounds during the flush season, he will be paid the winter price for six hundred pounds, the

Table 6.—The price the consumer paid for milk in 1922, to five plants in three cities in Texas

Four per cent butter fat basis.

Plant Number	Retail Milk			Wholesale Milk		
	Gallon of Milk	100 Lbs. Milk	1 Lb. Butter Fat in Milk*	Gallon of Milk	100 Lbs. Milk	1 Lb. Butter Fat in Milk*
	Cents			Cents		
Average	57.0	46.63	$1.63	37.5	$4.36	$1.09
2	60.0	6.98	1.73	35.0	4.07	1.02
4	60.0	6.98	1.73	35.0	4.07	1.02
8	60.0	6.98	1.73	.....	.....	.....
9	48.0	5.58	1.34	35.0	4.07	1.02
17	.....	.....	.....	45.0	5.23	1.31

*This is placing the value only on the butter fat, and does not consider the other constituents found in whole milk.

average amount he delivered during the winter months. For the one hundred pounds excess over the average production, he will be paid a price based on the price of sour cream, which, as a rule, is less than half the price paid for whole milk.

This is an advanced step which has had a reaction in getting the dairymen to manage their herds so as to get an even flow of milk the year around. It has also supplied the producers with more milk in the winter time when surpluses are not so large and tends to reduce the surplus of milk in the spring of the year when it is not so much needed for market-milk purposes. A number of these producers have complained that if a dairyman sells his cow to another dairyman in the spring, the dairyman purchasing the cows will be placed on a surplus basis, with all of his milk, on the assumption that he did not deliver milk during the winter months. They also contend that frequently the prices paid the producer for milk are cut and that the price the consumer pays for milk remains the same. Obviously the surplus rule should be made to apply to the same herd during both winter and spring regardless of ownership. The surplus milk problem is a vital one, and should be considered carefully by both producer and distributor, and is of enough general interest to command the attention of the consumer.

Table 6 gives the price the consumer paid for milk at five distributing plants located at Dallas, Houston, and Galveston, Texas. The three columns under "retail milk" give the retail price and the three columns under "wholesale milk" give the wholesale price the consumer paid for his milk by the gallon, for one hundred pounds of four per cent milk and for each pound of butter fat in the milk. By comparing Table 5, showing the price the distributor paid for his milk, with Table 6, the price the consumer paid for milk, it can be seen that the price the consumer paid varied less than the price the distributor paid. This bears out one of the complaints made by the producers: that is, that the consumer's price remains almost constant, while the price the producer gets from the distributor fluctuates, not only in different cities but several times yearly in the same city.

Table 7.—Distribution of consumer's dollar between producer and distributor as shown by four plants in two cities in Texas, 1922.

Plant Number	Producer (Per Cent)	Distributor (Per Cent)
Average	44.6	55.4
2	43.0	57.0
4	43.0	57.0
8	45.8	54.2
9	46.7	53.3

Table 8.—Dealer's spread.

Section	Quarts of Milk, in Cents
Texas	7.9
*Denver	4.4
*Kansas City	9.1
*Milwaukee	5.4
*Detroit	9.1
*Minneapolis	5.6
Average for fourteen cities	7.4

*Kelley and Clement, Market Milk, page 351.

Distribution of the Consumer's Dollar

Table 7 shows in percentage how the consumer's dollar is divided between the producer and distributor when he purchases dairy products from four milk-distributing plants in Texas. When the consumer spends one dollar for retail milk, the producer receives 44.6 cents and the distributor 55.4 cents.

The "spread" is the difference between 25.4 cents, the price the producer receives, and 57.0 cents, the price the consumer pays for a gallon of milk. This difference is 31.6 cents. By dividing 31.6 by 4 the distributor's "spread" is reduced to a quart basis. This "spread" is 7.9 cents per quart in four plants in Texas.

The Dealer's Spread in Four Plants in Texas Compared With That of Other Markets

The dealer's "spread" as shown in the above table is the difference in cents per quart of milk between what the producer gets and what the consumer pays. Table 8 gives the retail distributor's or dealer's "spread" in Texas, as compared with that of other sections. There is a "spread" of 7.9 cents per quart, which is above the average "spread" as compared with that of Denver, Milwaukee, Minneapolis, and slightly above the average for fourteen cities. The four Texas plants have a narrower "spread" than Kansas City or Detroit. A certain amount of "spread" between the producer and the consumer is necessary for risks taken and services rendered. When this "spread" becomes too large, it creates suspicion and dissatisfaction among the producers. It has not become serious in Texas yet. If, however, the producer would regulate his production more evenly throughout the year, there is no reason why the "spread" could not be reduced in a number of instances.

Cooperative Milk-Distributing Plants

One of the purposes for the establishment of cooperative milk-distributing plants is to enable the producers themselves to secure the dealer's "spread" by financing and assuming the risk of distributing their own products.

An effort in establishing cooperative milk distributing plants has been made in Texas in the last ten years, with some degree of success. Cooperative plants have been operating in the following cities: Fort Worth, Dallas, San Antonio, and El Paso. Of these four cities the plant in El Paso is the only one now in operation. This plant is known as the Rio Grande Dairy Association and was established in 1916. It handles milk, butter, ice cream, and a small amount of condensed milk, being one of the few plants in the State with a condenser. This cooperative plant returns 63 cents of the consumer's dollar to the producer. This figure cannot be compared with the producer's share as given in the preceding table, as the former includes other dairy products besides milk; the other comparisons are for milk only. The other three plants ceased operation primarily for two reasons: first, the plant was inadequately financed, and second, the members were too easily discouraged. When a depression came they were converted into private plants. These efforts, however, have not been entirely wasted. The dairyman in each instance has gained in education and experience. He has found the principle to be sound, and in most instances the plants have operated two years or more. In view of past experiences the next cooperative distributing plants will be operated by a selected membership, at least until well established and adequately financed.

THE MARKETING OF TEXAS BUTTER

The marketing of Texas butter will be treated primarily from the standpoint of physical distribution of butter. The production of butter fat will be discussed only as it relates to marketing.

Texas, as well as a number of the other Southern states, has passed through the promotion period of creamery building, and has now settled down to two distinct types of creameries; namely, the centralized creamery and the sweet-cream creamery.

Development of Creameries in Texas

Some of the salesmen for creamery machinery and supplies in the past have organized creamery-promotion enterprises in sections where there were not enough cows to supply sufficient volume of cream. Under such conditions, the overhead expenses soon put the plant out of business. The centralized plants came into existence on the basis of having cream-collecting stations scattered over a wide area, where the farmer and dairyman could sell their cream at any time. This method secured volume and placed the centralized plants on a sound basis.

Figure 4 gives the location and the number of creameries which were operating in Texas in 1915. The total number was sixty-eight. Seven years later, or in 1923, thirty, or approximately forty-two per cent, had ceased operation. The dots indicate that thirty-eight plants, or approximately fifty-eight per cent, are still in operation in some form. However, eleven of the thirty-eight plants had changed either to a cream

station or to an ice cream plant. This would leave approximately twenty-seven creameries in operation out of sixty-eight. By noting Figure 8 further, it can be seen that the majority of the creameries follow the blackland belt south from Grayson County to the Gulf of Mexico, with the largest group clustering in Fayette, Colorado, and Lavaca counties. At present dairy development is shifting westward in the State. The land previously used in the western part of the State for pasture is being cut up into smaller tracts and sold for farming purposes. This is stimulating the dairy interests in that section. High-producing dairy animals are being brought in and a few creameries and a number of cream stations are being established.

Table 9.—Average number of pounds of butter handled and cows furnishing milk to each plant.

Number of plants	6
Pounds of butter manufactured per plant	987,835
Number of stations per plant	119
Number of pounds butter fat shipped to plant by each station	6,888
Calculated number of cows per station	94
Calculated number of cows per plant	11,269

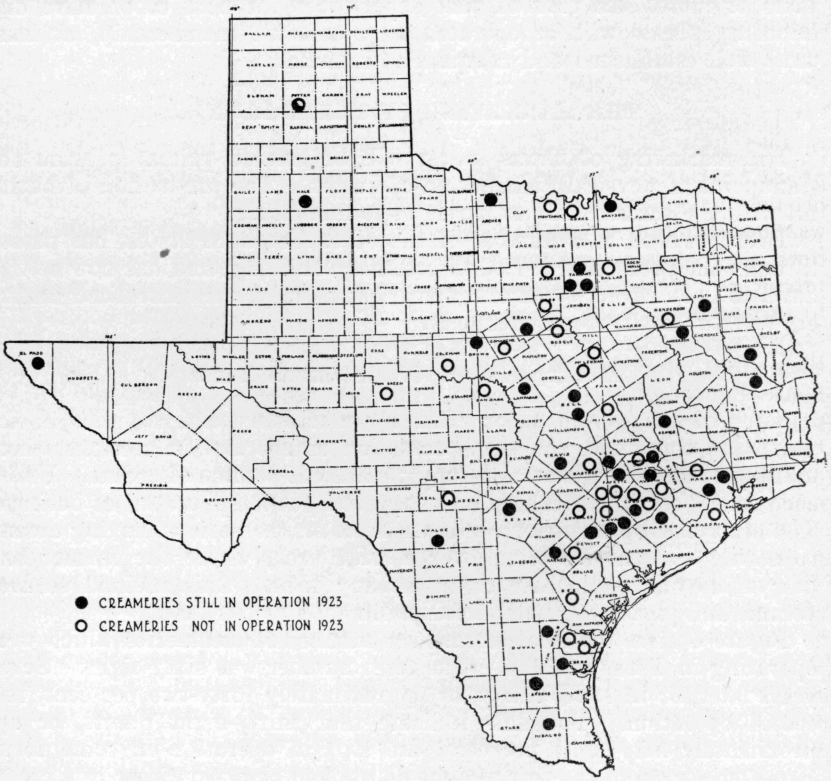

Fig. 4.—Location of creameries organized prior to 1915 in Texas.

Centralized Creameries

Table 9 gives data concerning the size and gathering facilities of a centralized creamery in Texas. The average number of pounds of butter manufactured in 1922 was almost a million pounds for each plant, with an average of 119.5 cream stations per plant. The large number of stations indicates that each creamery covers a wide territory. The cream stations averaged 6,888 pounds each of butter fat. By taking 73, which, as previously explained, is the amount of butter fat produced by the average Texas dairy cow and dividing it into 6,888, the amount of butter fat shipped by each station, we get 94.3, which is the calculated number of cows supplying butter fat to each station. This gives 11,269, the calculated number of cows supplying the average plant.

The centralized plant has a number of good features; among others, it gives the dairy farmers in thinly settled sections a market for their dairy products. The volume is usually large enough to attract efficient and business-like creamerymen who are able to conduct the business in the most improved way. There is one handicap, however, which the creameryman cannot correct alone. That is the poor quality of the cream he gets.

The Quality of Cream Should Be Improved

The question of how to improve the sour cream that is shipped through the cream stations is three-sided. It is one in which the producer, the station man, and the manufacturer are involved. The producer cannot see why he should not have a cream can and separate warm cream into it twice each day for a week, or until he takes it to town. The present method of buying cream does not encourage the production of high quality, since it does not offer sufficient premium to justify the great expense.

Very few cream stations are large enough to be a business within themselves, therefore, they are usually located in the back of a produce house or grocery store. Table 9 gives 6,888, the calculated number of pounds of butter fat shipped by a cream station each year. The station man gets on the average 3 cents per pound for weighing, testing, and shipping the cream. This amounts to $206.65, or about seventy cents per day for each working day in the year. Therefore, it is considered only a side line. The produce man realizes that he will stand a better chance to buy the farmer's eggs and chickens if he buys his cream. The groceryman realizes that he will stand a better chance to increase his cash sales if he hands out the cream checks.

For this reason neither the produce man nor the groceryman is likely to take the responsibility of telling one man his cream is poorer than another's. If he did, his competitor would probably buy it at the regular price in order to get the farmer's trade. The centralizer cannot afford to employ a man, rent a building, and equip it for a cream station when he collects less than seven thousand pounds of butter fat a

year. It cannot afford to employ enough field men to supervise the stations closely, for the overhead expenses would be too high. The centralizer is also anxious to keep its volume up and even increase it if possible.

Table 10.—Sweet-cream plants, pounds of butter manufactured per plant, number of dairymen, and amount of butter fat supplied by each dairyman.

Number of plants	3
Pounds of butter manufactured per plant	258,450
Number of dairymen supplying cream to plant	148
Pounds butter fat supplied by each dairyman	1,455

It is the problem of the creamerymen to establish two or more grades and regulate the price on a quality basis. However, the cream-station man and the producers must do their part. The producer especially should welcome this change. It will mean more to him over a period of time than to anyone else. It will not only offer reward for a quality product but will increase the sales and consumption of butter in Texas, thereby expanding the dairyman's opportunity.

Sweet Cream Creameries

In recent years a practice has grown up of making butter from cream that has not been allowed to become sour. A better grade of butter results from this practice, but added precautions are necessary to keep the cream from fermenting.

The first creamery in Texas to use only sweet cream in making butter was established in 1910 at Falfurrias. At present there are eight such plants in operation in the State. Their success has been due to a number of conditions. Three of the most important conditions are as follows: (1) a premium for butter fat in sweet cream over the sour-cream price, (2) sections where the dairy cow population is fairly dense and production higher than average for the State, and (3) existence of roads that can be traveled without great difficulty the year round. These sweet-cream plants produce a superior quality of butter, for which the public will readily pay a premium. Hence, such enterprises, where sufficient volume of sweet cream is available, will be successful.

Table 10 gives the number of pounds of butter manufactured by three sweet-cream plants. By comparing Table 9 with Table 10, it can readily be seen that the centralized plant manufactures almost four times as much butter as the sweet-cream plant. There are 148 dairymen supplying each 1,455 pounds of butter fat to the sweet-cream plant. The cream is collected daily except in one instance; this plant collects the cream every other day in the winter. The sweet-cream plants, as a rule, collect the cream or make some arrangement with the producer by paying him to deliver it. The producer is paid for this cream twice a month.

Table 11.—Price paid per pound for butter fat, price received per pound for butter.

Kind and Number of Plants	Prices paid for Butter Fat Delivered at Plant	Price Received for Butter F. O. B. Plant
Centralized 4	37.07c	38.80c
Sweet cream 3	49.07c	51.10c

Price Paid for Butter Fat, and Price Received for Butter by the Centralizer, and by the Sweet-Cream Creamery

Figure 5 shows clearly for twelve months the relation between the price paid for butter fat and the price received for butter by a centralized plant. In this figure it can be seen that there was very little difference in the price paid for butter fat and the price received for butter during the first two months. From March to July the price received for butter was greater than the price paid for butter fat. From August through the remainder of the year the price paid for butter fat was greater per pound than the price received for butter.

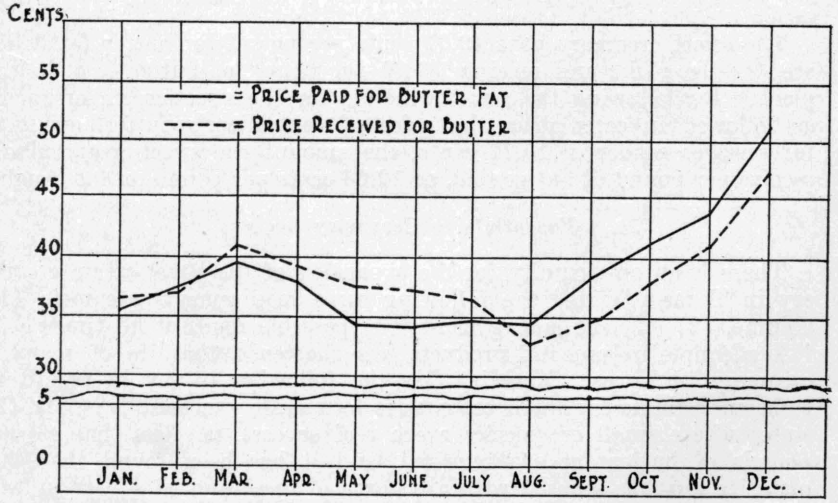

Fig. 5.—Price paid for butter fat and price received for butter by a single Texas plant, 1922.

Table 11 gives the price paid per pound for butter fat delivered to centralized and sweet-cream plants. The centralizer paid an average of 37.07 cents per pound for over 5,000,000 pounds of butter fat delivered at the plants, while the sweet-cream plants paid an average of 49.07 cents per pound for the fat 775,350 pounds of sweet cream delivered at their plants. In some instances two years elapsed during the time some

of these data were being collected; therefore, they cannot be used for making absolute comparisons, but are approximately correct. This would make a difference of twelve cents per pound between prices received for sour cream and prices received for smeet cream. The sour cream does not require the care of the sweet cream and lends itself to long transportation. The farmers out on the farms away from the high-priced land and high labor may be able to more than make up the difference in cheapness of production. Less equipment, and often less ice, is required in handling sour cream than sweet cream. On the other hand, the dairy farmer on a sweet-cream route will find it a distinct advantage to sell sweet cream.

Table 11 gives prices received by both kinds of plants for butter f. o. b. the plant. The centralizer received 38.80 while the sweet-cream plant received 51.10, a difference of 12.3 cents per pound.

The centralizer paid 37.07 cents a pound for butter fat delivered at the plant and received 38.80 cents per pound for butter fat f. o. b. the plant. The one hundred pounds of butter fat bought made at least 120 pounds of butter. The increase in volume is largely because of the water and salt incorporated into the butter. This 120 pounds of butter at 38.80 cents brought $46.56 or $9.49 more than the cost of the cream. This is 7.9 cents per pound on butter sold or 9.49 cents per pound on fat bought, which represents the centralizer's compensation.

The sweet creamery pays 49.07 cents per pound for butter fat delivered at the plant and receives 51.10 per pound of butter f. o. b. the plant. By following the same principle for the sweet-cream creamery as followed in calculating the price of centralizer's butter, one gets for services rendered, 10.21 cents, the amount the sweet-cream plants receive per pound of butter sold, or 12.25 cents per pound on fat bought.

Essentials to Creamery Success

There is an opportunity for the expansion of the sweet-cream creamery in Texas provided the following three requirements are met: (1) volume, (2) efficient management, (3) passable roads at all times.

Inadequate volume of products has shortened the life of many a creamery in Texas. Macklin* has the following to say in regard to sufficient volume for small creameries to operate successfully: "In the states where small creameries are a real success, not less than 80,000 pounds of butter fat are required, and it has been found that this quantity must be secured within an area of one hundred square miles." This statement applies to creameries handling sour cream and making butter only. A number of the small creameries of Texas, including most of the sweet-cream creameries, make ice cream in addition to butter. The volume of business should equal the requirement suggested by Macklin, which is a safe rule to follow. The hundred-square-mile

*Macklin, Kansas Experiment Station Bulletin No. 216, page 27.

area in which the fat must be gathered, however, can be increased in Texas for the sweet-cream creamery, which, because of the better quality of its butter, fares better in the market than does the centralizer, and since the sweet-cream plant makes more per pound of fat handled, it can probably operate on a lower minimum than the 80,000 pounds set by Macklin for sour-cream plants.

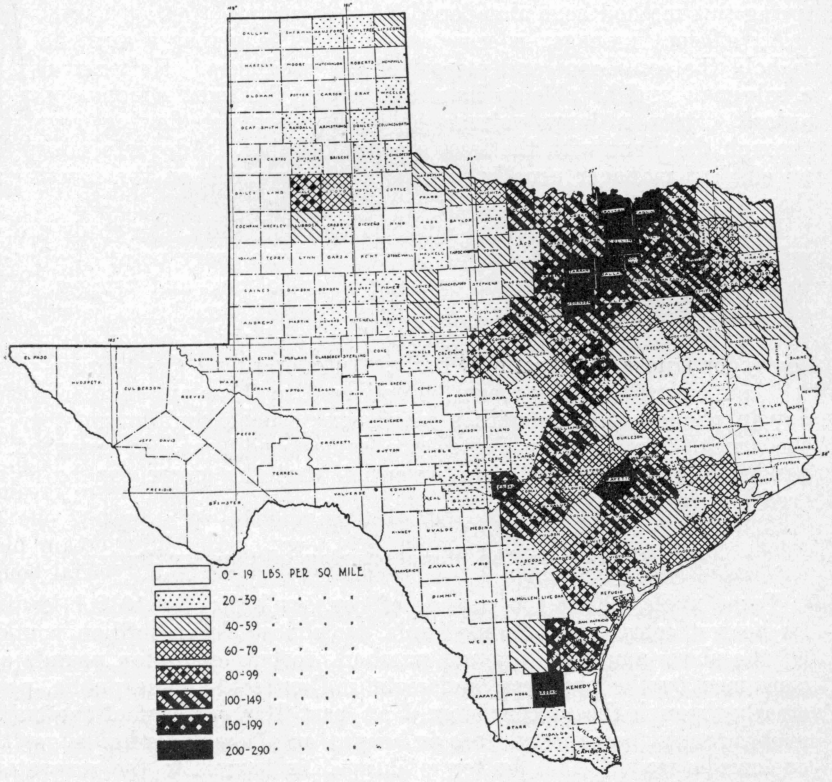

Fig. 6.—Butter fat sold in Texas counties per square mile.
From 1920 U. S. Census.

Figure 6, showing butter fat sold in Texas counties, indicates that 110 counties, or over forty-three per cent, do not sell nineteen pounds of fat per square mile; and that only 38, or fifteen per cent of the counties, produce one hundred pounds of fat or more per square mile. In order to see if a large amount of this production was clustered in a small section, further studies were made. It was found that only four counties sold over 80,000 pounds of butter fat for the entire county, which in all cases is more than the area of 100 square miles. The writer believes that it is practical for a sweet-cream plant to go

out as far as forty miles to gather cream, provided the roads are fair and the tonnage reasonably large. There are eight sweet-cream creameries being operated in as many counties in Texas and some of them are successfully operated on areas selling less than 80,000 pounds of fat per 100 square miles in Texas. However, even the small sour-cream creameries in this State have learned that it is not economical to establish long cream routes over too thinly settled areas. The centralizers trying this method have abandoned it.

An efficient manager is very essential. The manager must be able to hold the confidence and respect of the producers. He must also be a salesman and be able to handle labor in the most effective way in order to keep a large volume of quality product flowing regularly through the plant with the least amount of labor. Adequate salary for an efficient manager usually returns a higher profit on the investment than any other expenditure.

When several cream routes must be traveled daily, the roads are of prime consideration and should be studied from every point of view as to high-water mark on roads crossing river bottoms and bridges. The character of the soil over which the road passes should also be studied; that is, whether it is likely to get too loose and sandy, or too sticky and boggy for trucks to travel over daily. In operating a sweet-cream plant it is important that the cream be delivered to the plant regularly each day in prime condition with a maximum load and minimum wear on the truck. To a lesser degree the same conditions are essential in handling sour cream with the exception that the cream can be delivered less frequently.

Texas Leads in the Manufacturing of Country Butter

Texas made 49,405,152 pounds of country butter in 1919,* leading its nearest competitor, Pennsylvania, by almost eleven million pounds. Of the above amount, in round numbers, forty-one million pounds are consumed by the producer, and eight million sold to the public, principally through the grocery store. At least fifty per cent of the butter sold through the grocery store is bought at a loss in order to get the customer's trade. This butter is shipped in barrels to the renovators, where it is heated, strained, and churned with milk to restore its flavor. At best it is not possible to make as good a quality of butter from this product as could have been made from it at the beginning. When the cream is handled and churned properly, country butter is of a splendid quality. Farmers who make a high-quality butter often have regular customers who are willing to pay a premium for it. To a small extent this butter is sent by parcel post.

*A Handbook of Dairy Statistics, U. S. Department of Agriculture, page 27, 1922.

Texas Imports Creamery Butter

The four centralizers made fifty-six per cent of the butter which they handled from local products, while forty-four per cent of their trade was furnished with butter shipped into Texas from other states. The sweet-cream creameries and other local creameries transact practically all their business within the State. With a few exceptions they ship butter neither into nor out of the State.

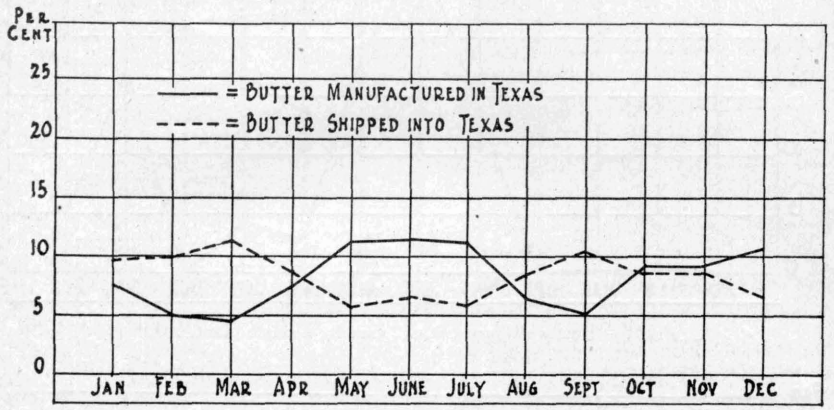

Fig. 7.—Butter manufactured in Texas and butter shipped into Texas by a single plant, 1922

Figure 7 gives in per cent by months butter manufactured and butter shipped into the State by a single plant for the year 1922. February, March, and September were months when the smallest amount was manufactured. The peak of the amount of butter shipped into the State came in March, going above 10 per cent for the month. September was the next highest month, the importation reaching 10 per cent. This graph shows a close relationship between the manufacture and importation of butter, as is very evident from the figure. The months of low manufacturing show big imports and the months of high manufacturing low imports.

Figure 8 illustrates the third movement of butter, which is butter shipped out of the State in car lots, by a single plant in Texas. June, July, and November are the high months, during which 62 per cent of the butter is shipped out of the State from this point. No butter was exported by this plant during the five months, January, February, March, April, and October. June is naturally expected to be a high month for butter exports. Following abundant spring growth of grass, June is usually one of the flush months in production. Similarly, the late fall months reflect the influence of the usual fall rains and fall pasturage.

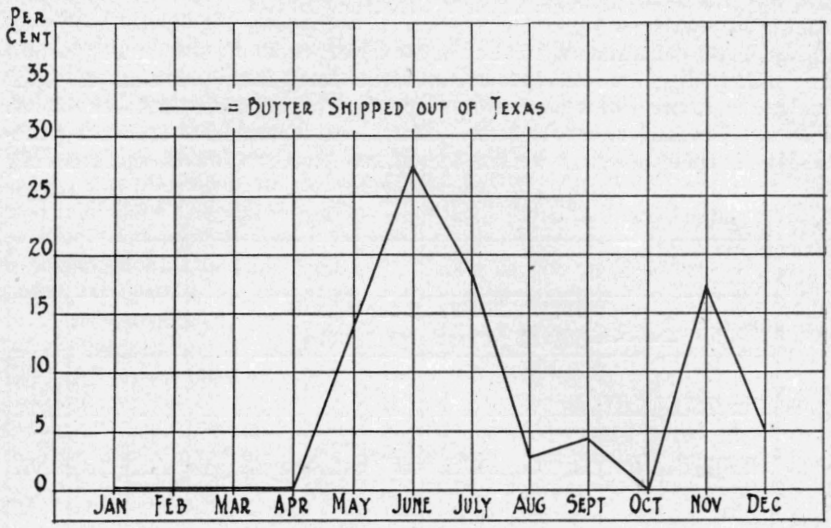

Fig. 8.—Butter shipped out of Texas by a single plant, 1922.

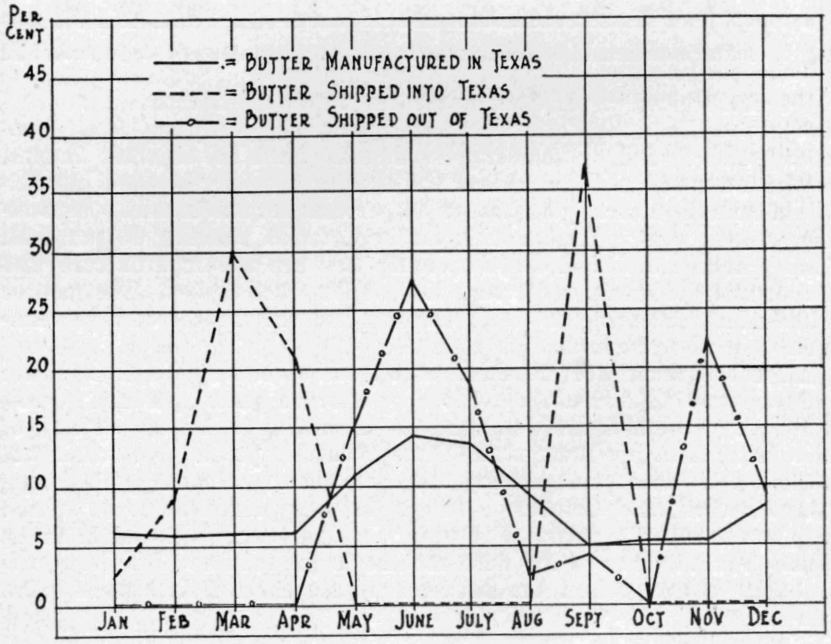

Fig. 9.—Butter manufactured in Texas and butter shipped in and out of Texas by a single plant, 1922.

Figure 9 gives an example of the movement of butter by a single plant. It takes men not only skilled in manufacturing, but also trained in marketing to know when to buy and sell to the best advantage.

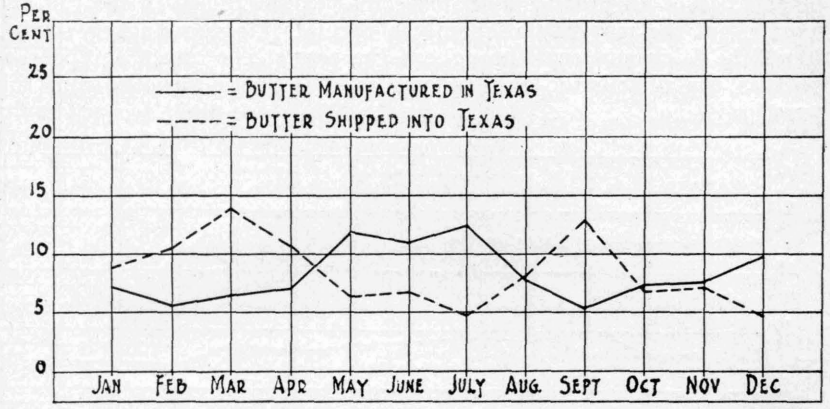

Fig. 10.—Monthly percentage of butter manufactured in Texas and butter shipped into Texas by four plants combined, 1922.

Figure 10 gives the amount of butter manufactured and the amount shipped into the State by four plants. It shows that the butter fat does not come to the plants in uniform quantities month by month. The solid line in Figure 7 shows that butter fat comes to the plant in the largest quantities during May, June, and July, and the lowest receipts are in September. This shows that the Texas farmers selling butter fat do not breed and feed for yearly uniform production. They let the cows freshen in the spring when dairy products are the cheapest. The hot winds in July and August dry up the grass and there is no very general planting of crops suitable for summer grazing.

According to the average of four centralized plants in Texas in 1922, a pound of butter fat brought 3.78 cents more in September than it did in August. The centralized plants in Kansas in 1915 paid 2.28 cents per yound more for butter fat in September than in July.* It is probable that the spread of 3.78 cents in Texas is slightly above the average over a number of years, as the price as shown in Figure 5 advanced rapidly from August through the remainder of the year, 1922.

Figure 11 represents the total sales of butter in four centralized plants during 1922. The sales did not vary over 3 per cent during the twelve months. March saw the highest sales and October the lowest. The thousands of people selling cream should study this particular problem more thoroughly and regulate their production to conform to it as nearly as possible.

Table 11 showed the difference between the price of sour cream and sweet cream to be twelve cents. A preceding paragraph showed that

*Macklin, Kansas Experiment Station Bulletin No. 216, page 46.

3.78 cents was the premium paid for butter fat produced in the fall over mid-summer. Not all cream producers can sell sweet cream, but the majority can improve on the way they are handling their cream at present. Not all producers can have their cows freshen in the fall and winter, but the majority of them can regulate their production so that it will be fairly uniform throughout the year. The cream shippers, as well as the distributor and general public, should benefit from this practice.

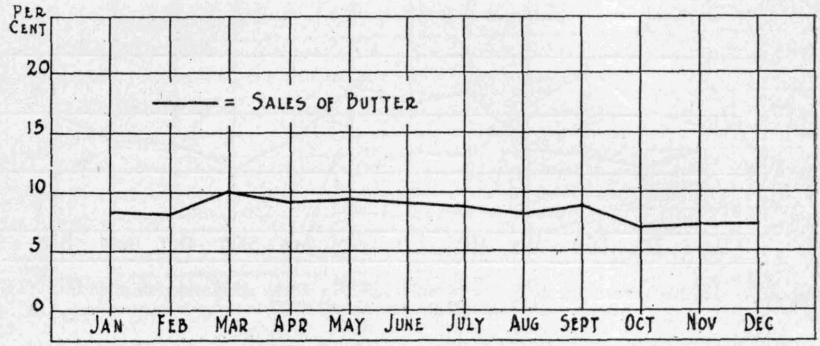

Fig. 11.—Monthly percentage sales of butter by four Texas plants combined, 1922.

THE MARKETING OF ICE CREAM IN TEXAS

Purpose and Scope of Study

The purpose of this study is to determine how ice cream is manufactured, handled, and marketed in Texas, and, where possible, to point out how improvements may be made in these processes.

The ice cream plants studied in this report are scattered throughout the State. We have selected a fair sample from various sections of the State rather than any particular section. This was deemed necessary because Texas has two hundred and fifty-three counties, covering a large area, varying greatly in climate, soil, and topography, a condition which tends to influence the distribution and consumption of ice cream.

Data have been collected from twenty-six Texas plants. Of these, nine of the large ones have been studied in detail.

Type of Plants Studied

The average length of operation for the twenty-six plants is 10.9 years. The oldest plant now in operation has run for twenty-two years. The twenty-six plants are divided according to products manufactured or handled as follows: ten manufacture ice cream only; ten manufacture ice cream and butter; while six manufacture ice cream and butter, and also handle milk. Nine of these plants which were studied more

in detail use whole milk and sweet cream in manufacturing ice cream. Six of the nine plants use, in addition to milk and sweet cream, milk powder, ranging from 37,500 pounds annually in the case of one plant to only a small amount in other cases. All plants prefer to buy locally all of the dairy products used in manufacturing ice cream. This cannot be done until Texas has a more economical production of milk and more adequate cold storage facilities. The nine plants have a yearly production of 1,522,706 gallons of ice cream, with an annual average production of 169,189 gallons for each plant.

Table 12.—Number of stockholders per plant, length of operation, authorized capital stock

Schedule Number of Plant	Number of Stockholders Per Plant	Length of Operation in Years	Authorized Capital Stock
Average	6.2	9.7	$ 75,375
6	13	15	150,000
11	4	7	125,000
12	4	13	20,000
19	4	4	6,500

Table 12 gives the number of stockholders, length of operation, and authorized capital stock of four typical Texas ice cream plants. Three of the four plants are owned by four people each; the other plant was owned by thirteen people. The length of operation, as shown by this table, varies from four to fifteen years, averaging 9.7 years. The authorized capital stock averages $75,375 per plant. The smallest is capitalized at $6,500 and the largest at $150,000. The variation in the authorized capital stock is greater than in the number of stockholders. The success of some plants with small capital stock shows further that an ice cream plant can be gradually developed. All of the plants listed in Table 12 are successful financially. These four ice cream plants are located in three cities in the State.

Table 13.—Kind of ice cream made and prices received.

Number of Plants	Kind of Ice Cream Made		Price Received per Gal. in City			
			Retail		Wholesale	
	Per Cent Plain	Per Cent Fancy	Plain	Fancy	Plain	Fancy
6	65	35	$1.63	$1.76	$1.13	$1.25

Table 13 gives the kind of ice cream made and the price received in six plants located in five cities in Texas. The plain cream produced averaged 65 per cent and the fancy cream average 35 per cent of the total. The plain cream, sold at retail prices, averaged $1.63 per gallon, while the fancy retail cream averaged $1.76 per gal-

lon. The wholesale price for plain ice cream was $1.13 per gallon, while the wholesale price for fancy ice cream was $1.25 per gallon, a difference of twelve cents per gallon as compared with 13 cents for retail ice cream. The difference between $1.63, the plain retail price, and $1.13, the plain wholesale price, is fifty cents, while the difference between the retail price and the wholesale price of fancy ice cream is fifty-one cents. The wholesale plain ice cream shipped by express brings $1.00 to $1.15 per gallon f. o. b. shipping point, while fancy ice cream brings $1.15 to $1.20 f. o. b. shipping point. A few plants are also making a special ice cream bringing $1.80 per gallon for plain wholesale and $1.90 per gallon for fancy wholesale.

Packing Ice Cream

Practices in Icing Holes: The packing of ice cream has influenced the selling price to a certain degree in the past. To illustrate the point, one plant charged $2.50 per week to pack each ten-gallon hole in the fountain where a can of ice cream is kept for its customers, but sold ice cream twenty-five cents per gallon less than the average price received by competing plants. It is easy to calculate the influence of this plan. Twenty-five cents per gallon for ten gallons is $2.50. The customer using only ten gallons of ice cream per hole a week breaks even; if he uses twenty gallons a week, he saves $2.50 per hole by this new method. If the customer uses less than ten gallons a week per hole, he would lose on the new plan twenty-five cents a gallon for each gallon less than ten and would likely buy on the regular terms of twenty-five cents more per gallon, free packing included, or would arrange to pack his own holes. This new plan is a good practice for the distributor to pursue in that it avoids unprofitable packing service.

The Cabinet and Iceless Refrigerator: In a few instances the customer is furnished with an ice cream cabinet by the distributor if he purchases as much as three gallons of ice cream daily. The free cabinet service is gradually being replaced by the iceless refrigerating cabinet. One of the popular ways of handling the iceless refrigerator is for the manufacturer to rent the refrigerator to his customers yearly, and give free service in keeping the mechanical parts in running order. The larger part of this rent is charged during the summer months. The iceless refrigerator is a decided advance over the old way of packing each can with ice and salt. The machine is automatic and is set to hold the temperature within the cabinet around 10 degrees F. This constant temperature assures less waste and keeps the ice cream in a salable condition at all times. Considering these factors, the automatic iceless refrigerator is cheaper to maintain than the old type.

Influence of Local Consumption on Success of Plant

The per cent of ice cream sold locally and the per cent shipped out of the city by six plants was studied, showing that 74.4 per cent is sold

within the city or within a radius of five to fifteen miles, varying with the size of the city; and 25.6 per cent is sold outside of the city, shipped usually by express. The shipping radius varies from 15 to 200 miles, with an average radius of 102 miles. The fact that 75 per cent of the ice cream shipped by the six plants is sold locally would indicate that the local consumption is a very important point to consider in starting an ice cream plant. The six plants operated on an average of 11.3 trucks per plant, with an average capacity of .63 tons per truck, a fact which indicates that the majority were small trucks. In addition to trucks, one plant used seven two-horse wagons to make deliveries.

Better Quality Will Increase Demand

A high grade sanitary ice cream has some possibilities to stimulate an increased consumption of ice cream in Texas provided the public is educated to its merits as a food. The writer has in mind a retail ice cream merchant who has a standing order with an ice cream plant for a very superior quality of ice cream. This merchant's ice cream trade has grown steadily, because he is selling a quality product. Far too much ice cream is made under extremely unsanitary conditions in Texas. Cellars and basements are often the places where the ice cream is made. As a rule they are damp and poorly lighted and not well ventilated, and are used as junk and storage rooms. The makers of ice cream in such surroundings demonstrated that they had very little or no regard for sanitation.

Influence of Climate and Season on Consumption of Ice Cream

Table 14 gives the high and low consumption of ice cream by seasons and by months. The data for this table and the figure that follows were collected to show the relation between climate and the consumption of ice cream.

Table 14.—High and low percentage consumption of ice cream by season and by months

Location	April, May, June, July, Aug., Sept.	Oct., Nov., Dec., Jan., Feb., Mar.	Highest Consumption		Lowest Consumption	
			Month	Per Cent	Month	Per Cent
Average	78.12	21.88	.....	18.35	.....	2.20
Alberta	90.50	9.50	July	25.40	Dec.-Feb.*	1.10
Maine	87.10	12.90	July	24.00	Jan.	0.60
Montana	86.40	13.60	July	21.50	Feb.	1.10
Iowa	81.80	18.20	June	18.20	Feb.	2.00
Virginia	74.10	25.90	July	15.60	Jan.	2.70
Texas	70.20	29.80	August	13.50	Jan.	1.90
Hawaii	56.70	43.30	July	10.30	Feb.	6.00

*Tied.

Edmonton, Alberta, Canada, was chosen for the point farthest north. The consumption of ice cream at Edmonton in April, May, June, July,

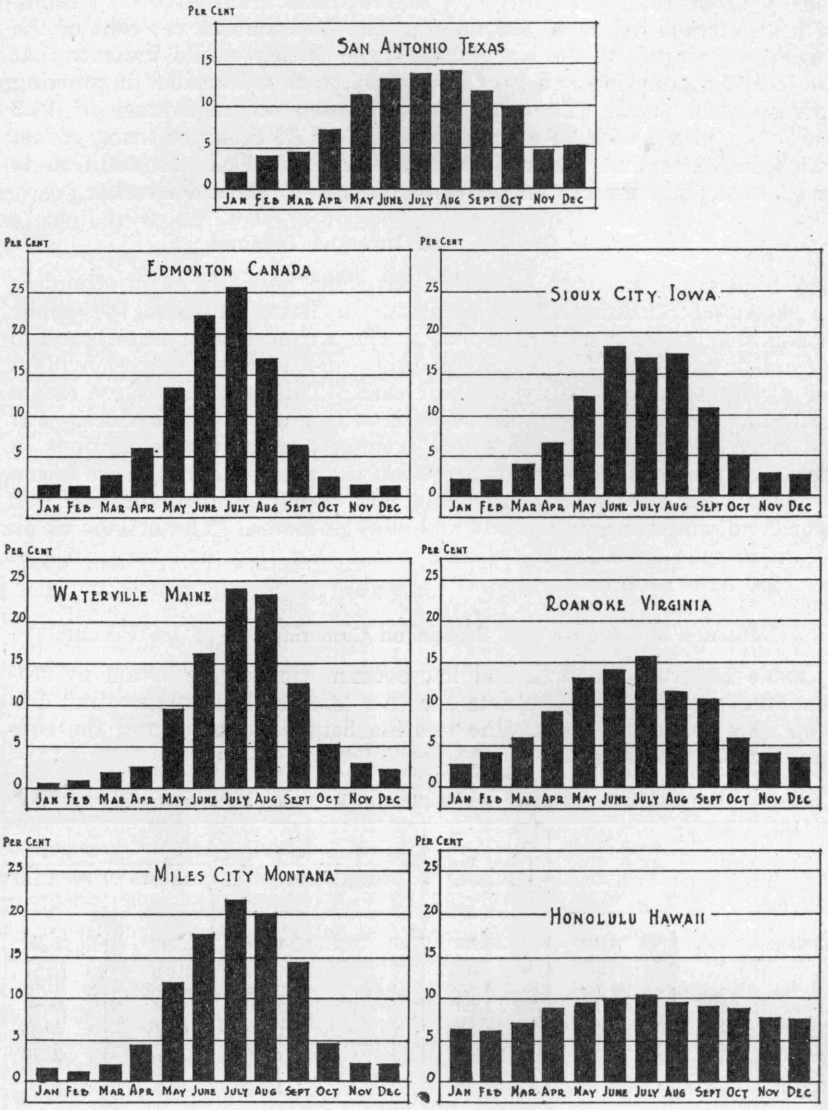

Fig. 12.—Monthly percentage distribution of ice cream by plants, 1922.

August, and September was 90.5 per cent of the total annual consumption, while during the other six months it amounted to only 9.5 per cent. This shows almost ten times as much consumption in the warm months as in the cold months. July is the month of highest consumption, showing 25.4 per cent. The consumption in December and February was the same, both showing 1.1 per cent.

Observing the records at each location on Table 14 we find the consumption increases in the warmer months and decreases during the colder months. The seasons of cold and warmth are not so definitely marked in Hawaii; the temperature is almost the same the year round; and likewise the distribution and consumption of ice cream is fairly constant there, varying only 13.4 per cent between the high and low seasons.

The average consumption of ice cream for the six warm months of all points considered is 78.12 per cent of the annual total, leaving only 21.88 per cent for the cold months. The average for the high month is 18.35 per cent and for the low month 2.20 per cent. Figure 12 may be studied in connection with Table 14. This figure gives the distribution by months and brings out the contrasts more plainly than does the table.

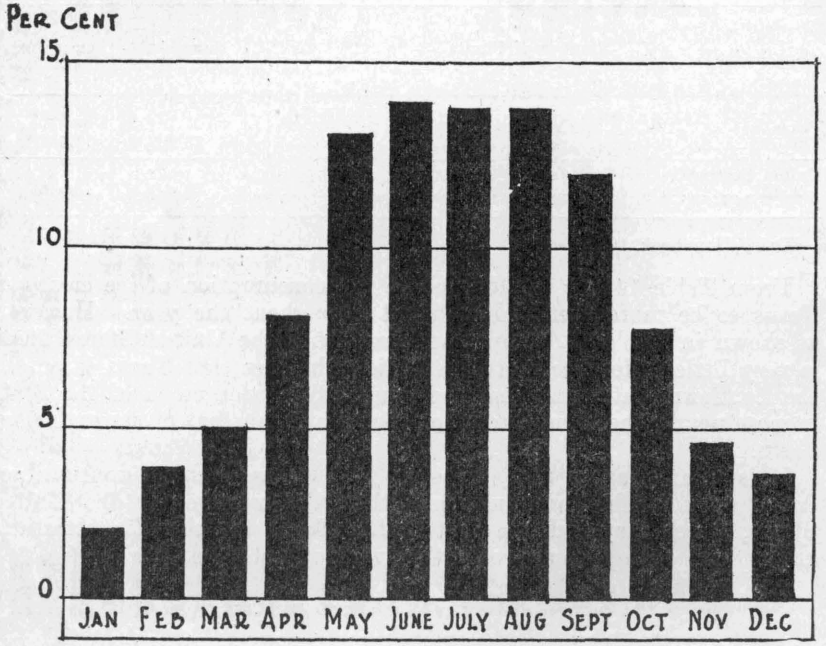

Fig. 13.—Monthly percentage distribution of ice cream by nine of the largest plants in Texas combined, 1922.

Figure 13 gives the monthly percentage distribution of ice cream by nine Texas plants. The month of June is only one-tenth higher than July and August. May is less than one per cent under June and September less than two per cent under June. During the five months from May to September the distribution of ice cream varies less than two per cent. There is a difference of 11.7 per cent between June, the highest month of distribution, and January, the lowest month of distribution.

Table 15 gives the seasonal distribution of ice cream from nine Texas plants contrasted with 2,427 ice cream plants in the United States. The year was divided into two equal parts of six months each, with the same division as in Table 14. During the warm season Texas distributed 73.6 per cent of ice cream for the year, while the United States distributed 74.4 per cent. During the cold season, Texas distributed 26.4 per cent, while the United States distributed 25.6 per cent. Table 14 brought out the fact that the climate influenced the seasonal distribution of ice cream, showing that the father south the plants were located, the more evenly the ice cream was distributed throughout the year.

Table 15.—Percentage distribution of ice cream by seasons.

Number of Plants	April, May, June, July, Aug., Sept.	Oct., Nov., Dec., Jan., Feb., Mar.
Texas 9	73.6%	26.4%
United States* 2,427	74.4%	25.6%

*Dairy Handbook, 1922.

From Table 14 one would suppose the consumption of ice cream in Texas to be more evenly distributed throughout the year. However, as shown in Table 15, comparing Texas with the United States, there is very little difference, notwithstanding the fact that Texas is one of the Southern states and that the temperature over much of the State is more nearly the same throughout the year than that of states farther north.

It is interesting to note, however, that Texas does not consume ice cream very much more uniformly than the average for the United States, which may indicate that within Texas the climatic variations are extreme enough to approach the average for the nation.

SUMMARY

The average annual production of milk in Texas counties as given by the Census of 1920 ranges from nothing up to 713 gallons of milk per cow. The highest average in the State is El Paso County.

Natural conditions in Texas are favorable for dairying. Cattle require but little housing; large amounts of protein are produced in the form of conttonseed meal; usually there is a long growing season for pastures and grain crops; the State is relatively low in per cent of tuberculosis affecting dairy herds.

The 15 milk plants studied in Texas may be classified as follows: 2 plants retail, 5 plants wholesale, and 8 plants retail and wholesale.

Methods of delivery of 11 plants are as follows: 2 plants use horses only, 6 plants use trucks only, and 3 plants use both horses and trucks. The truck ranks first in delivery, handling milk of over half the plants, horses and trucks second, and horses only third and last. The average load per horse was 255 quart-points, while the load per truck was 323 quart-points.

The plants studied in Texas show that the wagon carried an average of 383 quart-points. The average for Louisiana was 268, Ohio 361, Chicago 385, and New York City 252. Chicago is the only section listed showing more quart-points per wagon than Texas. Over half of the 11 plants studied do both retail and wholesale business. The wholesale plant ranks second in number and the retail plant third.

The majority of the distributors buy milk on the butter fat basis, paying 65 to 80 cents per pound of butter fat. The plants paying the higher price for butter fat demand a cleaner product than those paying the lower price.

In order to have a more even supply of milk, the distributors in some sections of the State base the price paid for milk during spring and summer on the amount of milk received during three or four winter months. For example: if a producer averages six cans during the designated winter months and eight during the summer, he is paid the regular price for 6 cans and a lower price for 2 cans. This has had a tendency to increase the winter supply when milk is often scarce, and decrease the spring flush.

The consumer paid 57 cents per gallon for retail milk in 1922 at plants studied and 37.5 cents per gallon for wholesale milk.

When the consumer pays a dollar for retail milk at the plants studied, the producer gets 44.6 cents and the distributor gets 55.4 cents. On a quart basis the producer receives 6.35 cents per quart of milk sold and the retail distributor receives 7.9 cents per quart for his services.

Since 1915 cooperative distributing milk plants have been started in Dallas, Fort Worth, San Antonio, Houston, El Paso, and other cities in Texas. At this time (1927) the El Paso cooperative plant is the only one in operation.

Texas is developing into the building of two types of creameries; namely, centralized plants and sweet-cream plants.

The centralizer collected cream from a vast area through cream stations and handled a large volume of sour cream, and paid on the average for the year 1922, 37.9 cents per pound for butter fat delivered at the plant and sold butter for 38.80 cents per pound.

For the centralized plant, some means for grading the cream should be provided that would meet the approval of the producer, station man, and plant. Such a system would raise the quality of butter manufactured. These plants could handle more cream than they get, since they are obliged to ship in a large amount of butter each year to supply their trade.

The sweet-cream creamery has the merit of handling a high quality product. Cream must be delivered daily in good condition. The average price paid for butter fat delivered at the plant is about 12 cents a pound above that paid by the centralizer. The butter sells proportionally higher than the centralizer's butter. The plant should have a volume of not less than 80,000 pounds of butter fat per year gathered over a radius not exceeeding 40 miles. The roads should be fair and passable at all times. This type of plant is increasing in Texas. There is a strong demand for sweet-cream butter.

The centralizer handles each pound of butter at less outlay of labor and money than the sweet-cream creamery.

The greatest amount of cream is shipped to the plants in the spring when the price is the lowest.

The consumption of butter does not vary over 3 per cent in any month of the year in Texas.

Of ice cream plants studied 10 manufactured ice cream and 16 manufactured other products in connection with ice cream. There was very little uniformity as to the number of stockholders, length of aperation, or authorized capital stock, the capital stock varying from $6,500 to $150,000 per plant, indicating that it is possible to start with a reasonably small plant and be successful. All the plants studied were successful financially.

About 65 per cent of the ice cream made is plain and 35 per cent fancy. The fancy sold, both retail and wholesale, 12 to 13 cents per gallon higher than the plain. The retail price was 50 to 51 cents per gallon higher than the wholesale price on both plain and fancy ice cream.

The iceless refrigerator is being used in some sections in place of the method of packing with ice and salt.

About 75 per cent of the ice cream is sold within the city limits where the plant is located, the remainder being shipped out over a radius of 102 miles.

In Alberta, Canada, 90.5 per cent of the annual ice cream consumption occurred during the 6 months of April, May, June, July, August, and September. For the same period Maine used 87.1 per cent, Montana 86.4 per cent, Iowa 81.8 per cent, Virginia 74.1, Texas, 70.2, and Hawaii 56.7. This indicates that points farther south use more ice cream during the winter.